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THE HYO-BRANCHIAL APPARATUS OF TYPHLOTRITON SPELÆUS STEJN.

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The cave salamander *Typhlotriton* was put in the family Desmognathidæ by Stejneger, in 1892.¹ The basis of this classification was chiefly certain skeletal characters, such as the structure of the vertebræ. The study of the hyo-branchial apparatus of this form seems to show other relationships.

In the larvæ of *Typhlotriton*, which are often found almost

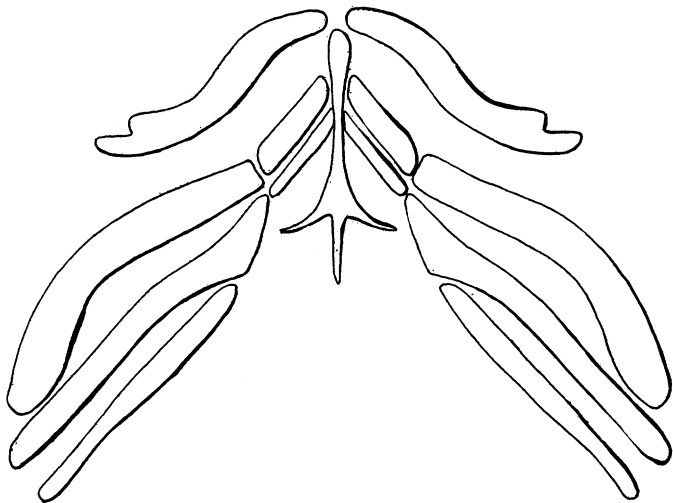


FIG. 1. Hyo-branchial apparatus of full grown larva of *Typhlotriton spelæus* from above, showing three branchial bars and a three-pointed "Copulastiel." $\times 6$.

as large as the adult, only three branchial arches are found, Fig. 1, instead of four which are found in the larvæ of other members of the family Desmognathidæ, Fig. 2.

In the adult *Typhlotriton*, the general character of the hyo-branchial apparatus is much like the type found commonly in the

¹ Stejneger, Leonhard, "Preliminary Description of a New Genus and Species of Blind Cave Salamander from North America, *Proc. U. S. Nat. Museum*, Vol. XV., 1892.

family Plethodontidæ, especially in the character of the very long first cerato-branchial, Fig. 3.

By a comparison of the hyo-branchial apparatus of larval *Typhlotriton* with the same parts in the larvæ of the Plethodontidæ, a striking resemblance may be noticed, especially in the fact that in *Typhlotriton* as in *Spelerpes* for instance, Fig. 4, there are only three branchial bars, while the general proportions of all the parts are about the same, as the figures show.

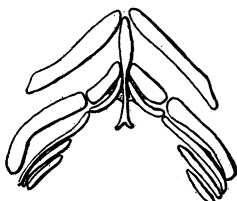


FIG. 2. Hyo-branchial apparatus of nearly full grown larva of *Desmognathus fusca* from above, showing four branchial bars. $\times 6$.

If the hyoid apparatus of *Typhlotriton* larva be compared with that of *Typhlomolge*, another cave form, but one that has external gills, a very striking resemblance is found between the two, Fig. 5. Emerson¹ who describes the hyo-branchial apparatus of this form, suggests that it shows in many ways a marked resemblance to a *Spelerpes* larva and that it differs widely from the members of the family Proteidæ in which it has been placed.

May not this then be a larva, possibly a permanent larva as suggested by Kingsbury² for *Necturus*? At any rate judging from the hyoid apparatus alone there seems to be a rather close relationship between the two forms *Typhlomolge* and *Typhlotriton*.

In comparing the hyoid apparatus of *Typhlotriton* with that of larval *Spelerpes*, it may be noted that in all essential respects the two structures are alike. There is a slight difference in the proportions of parts, and the tip of the "Copulastiel" of Gaup, has three parts in *Typhlotriton* while it only has one in *Spelerpes*. The similar one of *Typhlomolge* we find divided into two.

¹ Emerson, 2d, Ellen T., "General Anatomy of *Typhlomolge rathbuni*," *Proc. Bost. Soc. Nat. Hist.*, Vol. 32, No. 3.

² Kingsbury, B. F., "The Rank of *Necturus* among Tailed Bacteria," *Biol. Bull.*, Vol. VIII., 1905.

A summary of the points in which *Typhlomolge*, *Typhlotriton* and *Spelerpes* agree would be somewhat as follows:

1. All have three branchial bars in the larval form. The so-called adult, but possible larva *Typhlomolge*, has three.

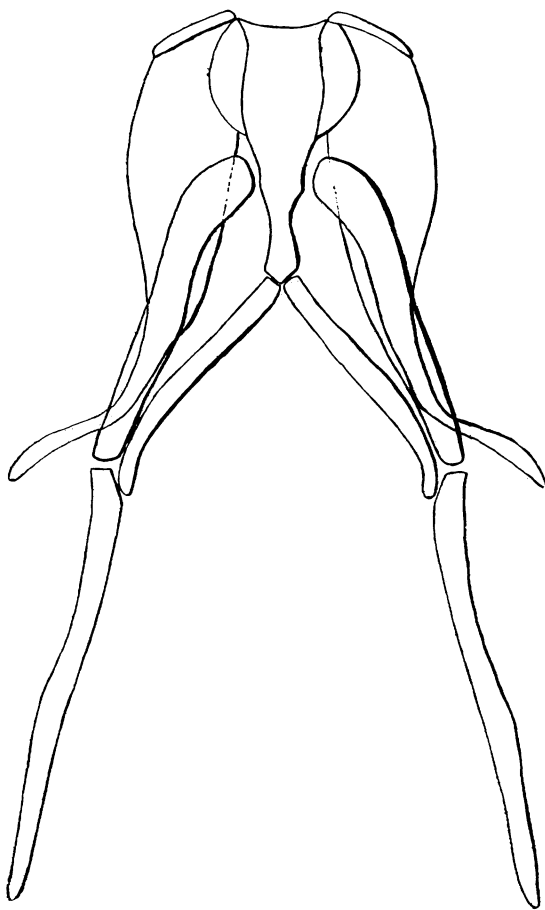


FIG. 3. Hyo-branchial apparatus of adult *Typhlotriton* from below, showing the long projecting 1st cerato-branchial. $\times 6$.

2. The proportions and general position of the parts of the hyo-branchial apparatus are much the same in all.

3. In the adult forms of *Typhlotriton* and *Spelerpes*, the first cerato-branchial is very long.

4. The larvæ of *Typhlotriton* and *Spelerpes* grow to some size before transforming.

5. All forms live away from the light much or all of the time, two have lost the use of their eyes and numbers of the genus *Spelerpes* live in caves to some degree.

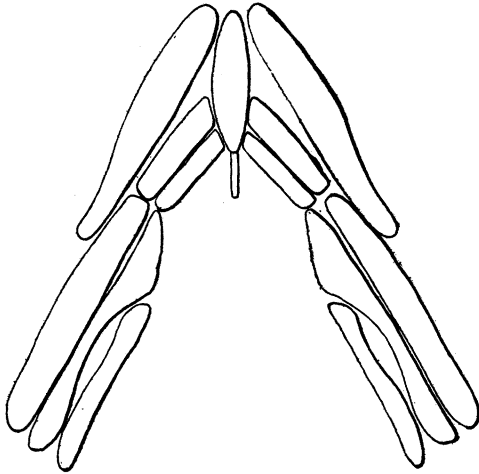


FIG. 4. Hyo-branchial apparatus of full-grown larvæ of *Spelerpes bilineatus* from below, showing the single "Copulastiel." $\times 6$.

Judging from these similarities may not a series of forms be named in which all the members are closely related to each other, and which shows the different degrees of adaptation of one distinct line of Urodela?

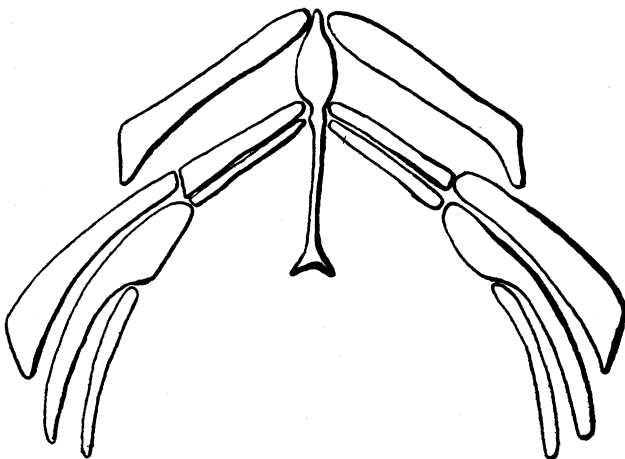


FIG. 5. Hyo-branchial apparatus of *Typhlomolge rathbuni* from above, after Emerson. $\times 6$.

1. *Spelerpes bilineatus* which is not found in caves to any degree.

2. *Spelerpes longicauda* resembling the first form, but often called a cave salamander, although it may be found out from caves now and then.

3. *Spelerpes manculicaudus*. More properly a cave form and closely resembles the next form in many ways on the one hand, as well as *longicauda* on the other, but has well developed eyes.

4. *Typhlotriton*, found in caves. Has lost the use of its eyes and is truly a cave form.

5. *Typhlomolge rathbuni* which is found in deeper caves and seems to be a permanent larva or the larva of an adult closely related to *Typhlotriton* and *Spelerpes*.

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